EECE 315, Lab Report (SAMPLE)

		Circle one
Number (i.e. Lab 01)		Pre / Class
Name	**FINAL LAB REPORT SAMPLE**	
Student ID		
Date		Wed / Fri
Collaborators	No Collaborators	

Testing of V_γ

Introduction:

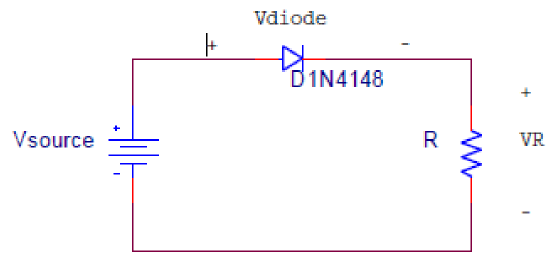
In this laboratory experiment, we are testing the turn-on voltage, V_γ of a diode. Using Pspice, we will map out our circuit for analysis. The circuit is a simple one with a DC voltage source, a varying resistor (ranged between 2,000-14,000 Ω).

For our pre-lab, we predicted what turn-on voltage we were expecting for the diode, while varying both the voltage source, and the resistor. From our findings, we plotted in Excell the results for V_D and I_D. We plotted our results against a semi-lograthmic scale. By doing this, it enables us to view our results as a linear plot, rather than an exponential one.

For the lab portion of our experiment, our task is to measure the i-v characteristics of a 1N4148 diode. We will be creating a physical circuit of the pre-lab using the lab kits provided for our use. On the breadboard, we constructed the simple circuit using the resistance we selected from our Pre-lab. From this circuit, we analyzed the board using the digital multimeter.

Apparatus Diagram:

For the Pre-lab, we drafted the following schematic in Pspice:



Experiment Procedure:

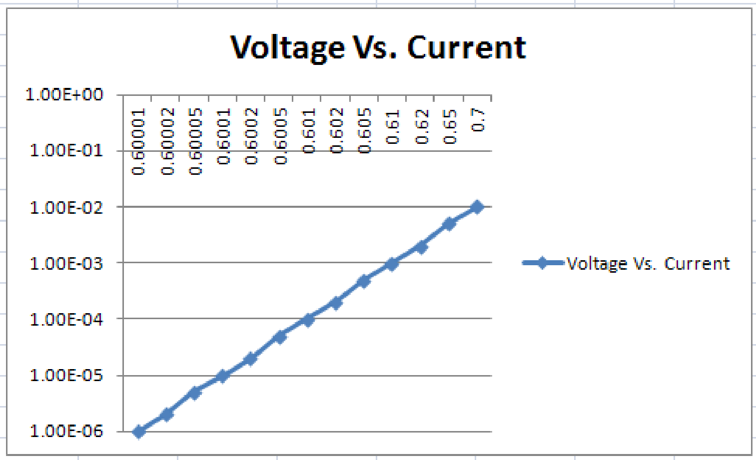
Our Pre-lab procedure was all done digitally with the computing platform Pspice. Once we got to lab, we first needed to set up all of our equipment properly so that we don't have any problems during our testing. First, we had to make sure that the computer was fully booted up before turning on our oscilloscope and multimeter. This is because you can sync the oscilloscope output on to the computers using the program *Open Choice Desktop*. Once this has been done, we can get a digital output on our computer of all our oscilloscope results.

Our circuit was constructed on a breadboard, and we used a variable resistor for R_{VR} so that it is easy for us to test the same diode over different resistance values. By trying 2 different values of resistance, we measured (with the multimeter) the voltage drop across both the diode and the resistor. We kept our results to a minimum precision of 3 significant digits. Once we had the voltage drop across the resistor, we now know the diode current, I_D. We then adjusted the DC voltage source or the resistance so that we got the correct current, and tabulated our data on an excel spreadsheet.

Data:

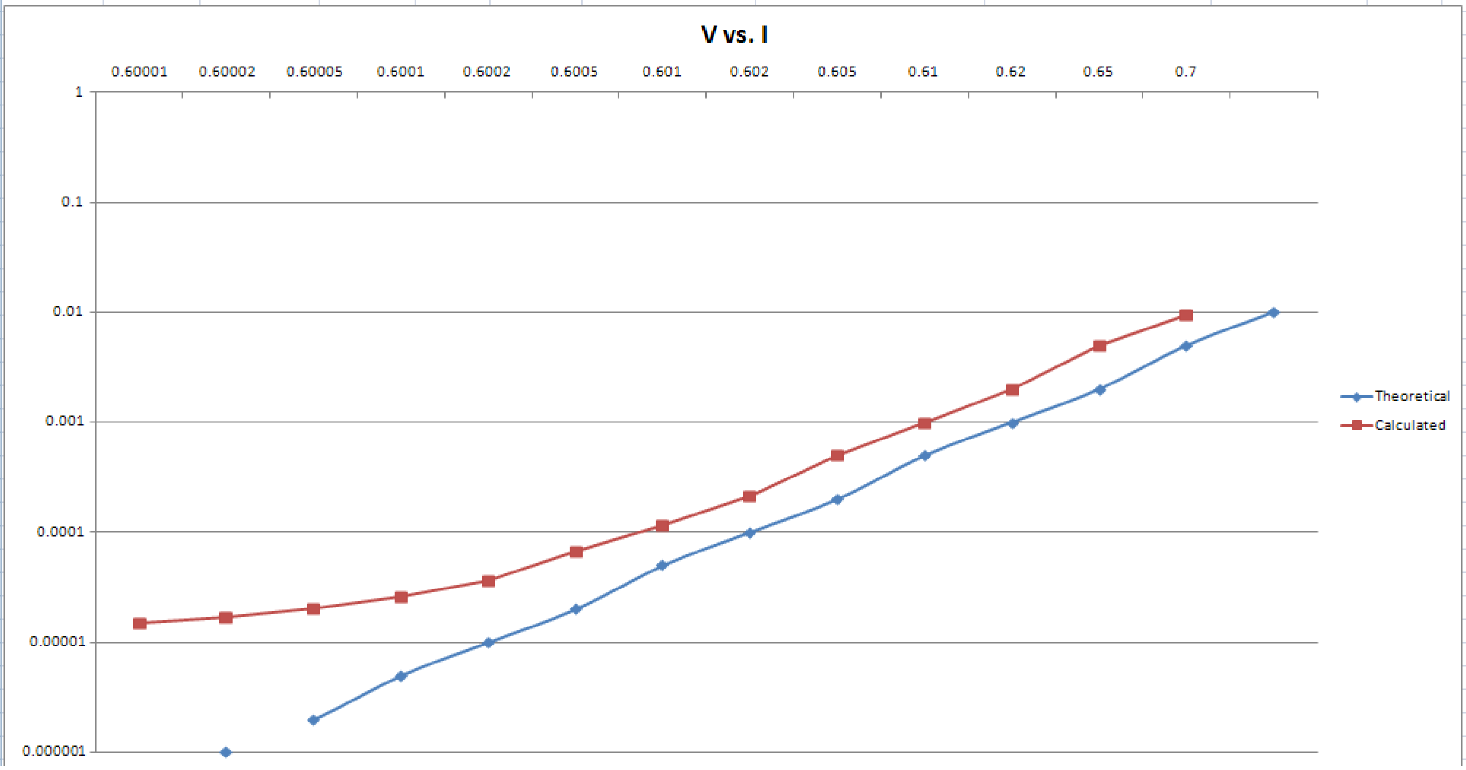
These are the results from the pre-lab:

0.7101	11000	1.00E-05	0.6001	10
0.8002	10000	2.00E-05	0.6002	10
1.0505	9000	5.00E-05	0.6005	10
1.401	8000	1.00E-04	0.601	10
2.002	7000	2.00E-04	0.602	10
3.605	6000	5.00E-04	0.605	10
5.61	5000	1.00E-03	0.61	10
8.62	4000	2.00E-03	0.62	10
15.65	3000	5.00E-03	0.65	10
20.7	2000	1.00E-02	0.7	10



This was the data from our lab results. We plotted our calculated values of V vs I against our theoretical values of a perfect-case scenario which we calculate from the pre-lab:

V_D	I_D	Diode Current	Resistance	Rf	Vps	Measured V_D	Measured V over R	Measured/Calculated Current
0.60001	1.00E-06	1uA	14000	10	0.61401	0.4033	0.2067	1.47643E-05
0.60002	2.00E-06	2uA	13000	10	0.62602	0.409	0.2174	1.67231E-05
0.60005	5.00E-06	5uA	12000	10	0.66005	0.4182	0.2454	0.00002045
0.6001	1.00E-05	10uA	11000	10	0.7101	0.4293	0.2865	2.60455E-05
0.6002	2.00E-05	20uA	10000	10	0.8002	0.4446	0.362	0.0000362
0.6005	5.00E-05	50uA	9000	10	1.0505	0.4723	0.5954	6.61556E-05
0.601	1.00E-04	100uA	8000	10	1.401	0.4986	0.9159	0.000114488
0.602	2.00E-04	200uA	7000	10	2.002	0.5293	1.503	0.000214714
0.605	5.00E-04	500uA	6000	10	3.605	0.5722	3.058	0.000509667
0.61	1.00E-03	1mA	5000	10	5.61	0.6062	5	0.001
0.62	2.00E-03	2mA	4000	10	8.62	0.6415	8.012	0.002003
0.65	5.00E-03	5mA	3000	10	15.65	0.6882	14.92	0.004973333
0.7	1.00E-02	10mA	2000	10	20.7	0.727	19.228	0.009614



Collaborators:

Discussion:

After getting our results, we used our values for the voltage drop across the diode, V_D, while keeping our resistance and power source voltage up to date with the required values from our table from our pre-lab. We were running into some discrepancies with a few rows of our data, where our predicted values of I_D were inconsistent with our experimental results. We improved our data by taking the voltage drops across the resistor for these situations, and divided this by the resistance, and our data became more consistent. We finally plotted the Voltage (V_D) with respect to the current (I_D) of our diode, and showed how on a logarithmic scale for current, the voltage needs to be increased only slightly to see a decade-scale eruption of current.

During our testing, we varied our voltage source from 0V-20V, but while doing this, we only saw a minimal difference in the voltage drop across the diode. The voltage drop that we measured ranged only from .7 Volts to .4 Volts.

Conclusion:

From this laboratory experiment, we learned many things about the diode. We tested the turn-on voltage, V_γ across a range of voltages from .4V to .7V. However, it was at the miniature scale of voltage range from .6V to .68V that was most interesting to us, and it is here that we see the current, running through the diode, raise exponentially once V_γ is reached. In order to see a smooth plot of these results, we plotted the Y scale of our data graph as an exponential scale of the current, I_D. This was a fun lab to do, and taught me much about how the current gets “turned on” with the diode.